

Veerasamy Vijayen et al.
Application No.: 09/165,513
Page 2

PATENT

1 39. (Previously Amended) An article as in claim 38, wherein the layer
2 comprises between about 8 and 18 atomic percent hydrogen.

1 40. (Previously Amended) An article as in claim 38, wherein the layer
2 comprises between about 4 and 30 atomic percent nitrogen.

1 41. (Previously Amended) An article as in claim 40, wherein electrical
2 conductivity of the layer varies with the nitrogen percentage.

1 42. (Previously Amended) An article as in claim 41, wherein the electrical
2 conductivity of the layer varies by 5 orders of magnitude.

1 43. (Previously Amended) An article as in claim 38, wherein the sp^3 carbon-
2 carbon bonds are stable at about 700°C.

1 44. (Previously Amended) An article as in claim 38, wherein the layer is
2 smooth and continuous.

1 45. (Previously Amended) An article as in claim 38, wherein the layer
2 comprises more than about 35% sp^3 carbon-carbon bonds.

1 46. (Previously Amended) An article as in claim 38, wherein the layer
2 comprises more than about 70% sp^3 carbon-carbon bonds.

1 48. (Previously Added) An article as in claim 38, wherein the single peak
2 Raman spectrum has a maximum peak intensity at about 1518 cm^{-1} .

1 49. (Previously Added) An article as in claim 48, wherein the maximum peak
2 intensity is associated with a G-peak.

1 50. (Previously Added) An article as in claim 38, wherein the single peak
2 Raman spectrum has a width of about 175 cm^{-1} .

1 51. (Previously Added) An article as in claim 38, wherein the single peak
2 Raman spectrum is characterized by a generally smooth curve.

1 52. (Previously Added) An article as in claim 51, further comprising at least
2 one localized secondary perturbation offset from the generally smooth curve.

Veerasamy Vijayen et al.
Application No.: 09/165,513
Page 3

PATENT

1 53. (Previously Added) An article as in claim 38, wherein the layer has a
2 thickness of less than about 75Å.

1 54. (Previously Added) An article as in claim 38, wherein the layer has a
2 thickness of less than about 50Å.

1 55. (Previously Added) An article as in claim 38, wherein the layer has a
2 hardness of over about 50 GPa.

1 56. (Previously Added) An article as in claim 38, wherein the layer has a
2 hardness of about 80 GPa.

1 57. (Previously Added) An article as in claim 38, wherein the layer has a
2 density of more than about 2.5 g/cm³.

1 58. (Previously Added) An article as in claim 38, wherein the layer does not
2 include macroparticles.

1 59. (Amended) An article comprising:
2 a substrate; and

3 a layer disposed over the substrate, the layer comprising a highly tetrahedral
4 amorphous carbon having more than about 15% sp³ carbon-carbon bonds and a single peak
5 Raman spectrum, the layer further comprising at least one of hydrogen and nitrogen, wherein the
6 sp³ carbon-carbon bonds are at least in part formed by directing an energized stream of carbon
7 ions having a uniform weight and a substantially uniform impact energy toward the substrate.

1 *Please cancel claim 60.*

1 61. (Amended) An article as in claim 59, wherein the sp³ carbon-carbon
2 bonds are at least in part formed by directing an energized stream of carbon ions toward the
3 substrate with an ion impact energy between about 100 and 120 eV for each carbon atom.

1 62. (Amended) An article comprising:
2 a substrate; and

3 a layer disposed over the substrate, the layer comprising a highly tetrahedral
4 amorphous carbon having more than about 15% sp³ carbon-carbon bonds and a carbon bonding
5 pattern characterized by a single peak Raman spectrum;

Veerasamy Vijayen et al.
Application No.: 09/165,513
Page 4

PATENT

6 wherein a percentage of sp^3 carbon-carbon bonds in the layer increases as a layer
7 thickness decreases.

1 63. (Amended) An article comprising:

2 a substrate; and

3 a layer disposed over the substrate, the layer comprising a highly tetrahedral
4 amorphous carbon having more than about 15% sp^3 carbon-carbon bonds and a carbon bonding
5 pattern being free from a D-peak Raman spectrum;

6 7 wherein a percentage of sp^3 carbon-carbon bonds in the layer increases as a layer
thickness decreases.